strong upper layers of rock into domed or arched forms, relieving the pressure beneath, at least for a time. This view differs widely from the one commonly held, viz. that the underground chambers of lava represent intrusions through the strata on which they rest, and that the pressure of the lava has itself elevated the roof of the chamber. The author ably supports his thesis by many different lines of evidence.

Textile Technology.

Textiles. By Prof. A. F. Barker. With chapters on The Mercerized and Artificial Fibres, and the Dyeing of Textile Materials, by W. M. Gardner; Silk Throwing and Spinning, by R. Snow; The Cotton Industry, by W. H. Cook; The Linen Industry, by F. Bradbury. (Westminster Series.) Revised edition. Pp. xii+386. (London: Constable and Co., Ltd., 1922.) 15*s*.

OF the great trinity of human life's essential needs —food, shelter, and clothing—practically all the articles of clothing, as well as a considerable number of articles for improving the shelter, are derived from textiles. The provision of these and other articles has led to the development of the great textile industries. These industries together form the only serious rival to agriculture for chief place among the industries of the United Kingdom, while they rank supreme in their contribution to the country's exports, of which no less than some 40 per cent. are textiles.

It might be expected, therefore, that a large number of people would be interested either as producers or consumers in such a work as the present, which aims at giving in brief compass an outline of the textile industries in their historical, technical, industrial, and commercial aspects. The book opens with an historical introduction; there follow descriptions of the raw materials and their production, and of the principles and processes of spinning, weaving, designing, and finishing. Later chapters deal with the separate industries in turn, namely, the woollen, worsted, cotton, silk, linen, dress goods, etc., and the carpet industries. On the whole the purpose of the book is successfully achieved. The author rightly emphasises the fact that it is the article finally produced which determines the raw material employed and the processes through which this passes. It is for this reason that he deals first with the general principles of spinning and then with the various preparatory processes, which were developed later chronologically for the purpose of presenting the raw material to the spinning machines in a convenient form. The chapter on spinning, in which are described the modern machines and their relation to the old methods, is the best chapter in the book; the account of the preparatory processes is somewhat scanty, rather disjointed, and occasionally inaccurate. Improvements might be made in certain other directions. Thus, the descriptions of machines sometimes suffer from the absence of explanation of some of the technical terms used; while the replacement of a number of the illustrative photographs by line drawings would add considerably to the value of the book.

It is to be regretted that there is no uniformity of plan in dealing with the separate industries; each special contributor writes from his own particular point of view, with the result that a recasting of their work would be necessary to preserve the unity of the whole. None of these special chapters compares favourably with Prof. Barker's own contributions in general treatment and the selection of material; and in too many instances the statistics and other information, having remained unchanged from the 1910 edition, are now so out-of-date as to be misleading.

In spite of its deficiencies, however, this work remains probably the best in English affording a general introduction to the study of textile technology, and as such it is to be commended.

Highway Engineering.

Les Chaussées modernes. Par Prof. P. Le Gavrian. (Encyclopédie du Génie Civil et des Travaux Publics.) Pp. 431. (Paris: J.-B. Baillière et Fils, 1922.) 40 francs.

THE publication of this text-book marks another step forward in the evolution of one of the most recent developments of engineering and is therefore to be welcomed. Road engineering in its modern form may be said to be contemporaneous with the motor car, the advent of which has again brought a large portion of the national transport on to the roads after an eclipse which lasted from the decline of the stage coach, or even the Roman period, until the introduction of the internal-combustion engine for road vehicles.

The problem of constructing roads to suit modern traffic has probably been best met in Great Britain, but the task fell to busy men, the engineers to the local government authorities, who have had many other pressing and difficult problems to deal with during the same time. Consequently, the practice which has been developed, although well described in the periodical literature, has not been codified or reduced to the form of text-books, although two small publications by Mr. H. P. Boulnois and Mr. F. Wood have to a certain extent met the want.

France has, however, already established a Chair of Highway Engineering, the first occupant of which is

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the author of this book, while the project is still under discussion in this country. The chair being established, the need of a text-book has been immediately felt and M. Gavrian has met the want by his excellent book.

The first point that strikes one is that the author does not assume previous knowledge of the subject but begins by a discussion of the conditions to be satisfied and the materials which are available, but it is obvious that he expects the student to have a working acquaintance with chemistry, physics and elementary engineering.

The consideration of the action of vehicles on the road surface and *vice versa* is clear and concise; it deserves to be well considered by every one who is interested in the road problem as there is much confusion and uncertainty on this aspect of the problem.

Another section worthy of every commendation is the chapter devoted to definitions and nomenclature. The application of the same or similar names to different substances and compounds in England, France and America has led and can only lead to misapprehensions and failure to take advantage of experience gained in other countries. It is gratifying to note that English nomenclature meets with his approval, and until a standard international nomenclature is established his summary of the differences will be most valuable. The second and third chapters are devoted to a description of the production and testing of tars, pitches and other binding materials, the latter of which is probably worthy of more careful attention than is always given to it, since some failures have undoubtedly been due to materials differing in composition and properties from those employed successfully elsewhere.

A discussion of the relative usefulness and suitability of various rocks and slags in combination with different binders would have been useful as a separate section, while the binder used in Rocmac deserves more space as it has advantages in certain situations probably not possessed in the same degree by other materials.

Considerable attention is given to the manner in which pot holes are formed and the obscure phenomena known as corrugation of road surfaces. No conclusion is put forward with regard to the latter, but the need for careful research is urged. It is probably not a simple problem and will resist resolution for some time as the related problem of the corrugation of steel rails subjected to electric traction has done although the conditions can be much more exactly determined in the latter case.

M. Gavrian has collected a considerable quantity of data on the tractive effort required on different types of road surface and for different types of tyres; this is all to the good as the publication of authoritative figures should do much to reconcile transport owners to the high cost of modern roads by showing that there is reduction in cost in another direction. The destructive effect of certain kinds of tyre is also well brought out and may help towards their elimination if it brings home to the vehicle owner that any slight advantage he may gain individually has to be paid for eventually in greater expenditure on the road itself.

A standard English text-book of this type would be of great assistance to the student not only of highway engineering but of general engineering also, as the subject is too often neglected.

Radio-Communication.

(1) *Die drahtlose Telegraphie und Telephonie.* Bearbeitet von Dr. P. Lertes. (Wissenschaftliche Forschungsberichte. Naturwissenschaftliche Reihe. Herausgegeben von Dr. R. Ed. Liesegang. Band IV.) Pp. xi+152. (Dresden und Leipzig: T. Steinkopff, 1922.) 4*s.*

(2) *Marine Wireless Pocket Book for the Practical Operator and Student.* By W. H. Marchant. Pp. vii+180. (London: Sir I. Pitman and Sons, Ltd., 1922.) 6*s.* net.

(3) *Continuous Wave Wireless Telegraphy: A Non-Mathematical Introduction to the Subject of Wireless Telegraphy from the Engineer's Point of View.* By B. E. G. Mittell. (Pitman's Technical Primer Series.) Pp. xvi+114. (London: Sir Isaac Pitman and Sons, Ltd., 1922.) 2*s.* 6*d.* net.

THE development of the art of radio-communication has been so rapid that much of the apparatus described in technical books on the subject is either obsolete or is very little used. Its inclusion, however, may be justified on the ground that it is wanted by students for examinational purposes. As the number of books on the subject is large and is rapidly increasing, the expert who reads them all will naturally weary of going over the same ground so often.

(1) Dr. Lertes's book will be of value as a work of reference. The descriptions are much too brief to be followed by any one who is not thoroughly familiar with the subject. A wealth of references are given which will be useful to any one who is making a special research on some branch of the subject. It would, however, be a help to the reader if the references were subdivided under various headings such as mathematical, physical, technical, and commercial. The ground covered is very wide and an account of the Johnsen and Rahbek electrostatic relay is included.

(2) This pocket book is intended principally for the

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